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US 4662877 A

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(54) Disposable absorbent article of hygiene with surface web provided with an opening for receiving stools

(57) The article comprises an absorbent pad (2) arranged between an outer support sheet (1) and a surface sheet (3), the surface sheet comprising an elongate opening (5) which is offset toward the rear to be centered with respect to a point of acquisition of stools, and two elasticized longitudinal folds 10, on either side of the opening, which each have a first region in which the fold is folded toward the longitudinal axis of the article and fixed to the underlying part of the sheet (Figure 2), and a second region (Figure 3) where the fold is free over most of this region, is folded toward the outside or the inside with respect to the longitudinal axis and fixed to the underlying part of the surface sheet only in proximity to the front transverse edge (6) of the article (Figure 4). The article allows better confinement of stools and improved leaktightness to leaks of urine.

FIG.1

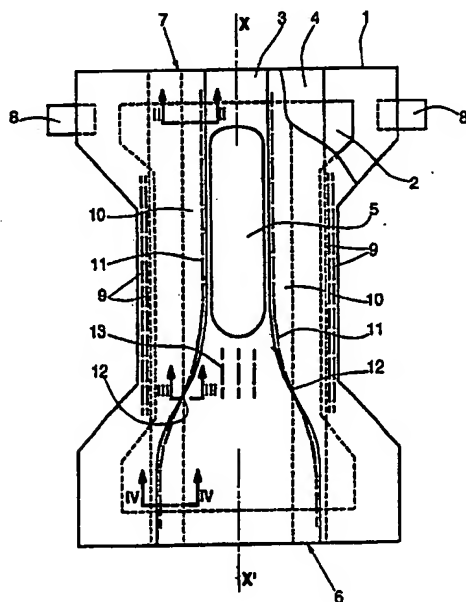


FIG.2

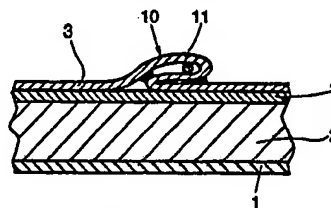


FIG.3

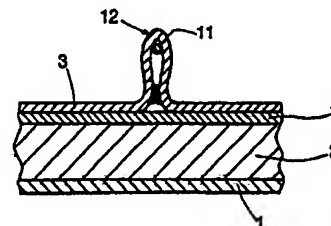
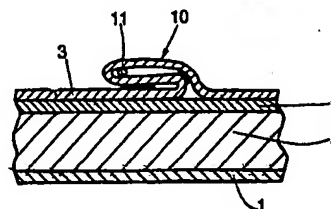
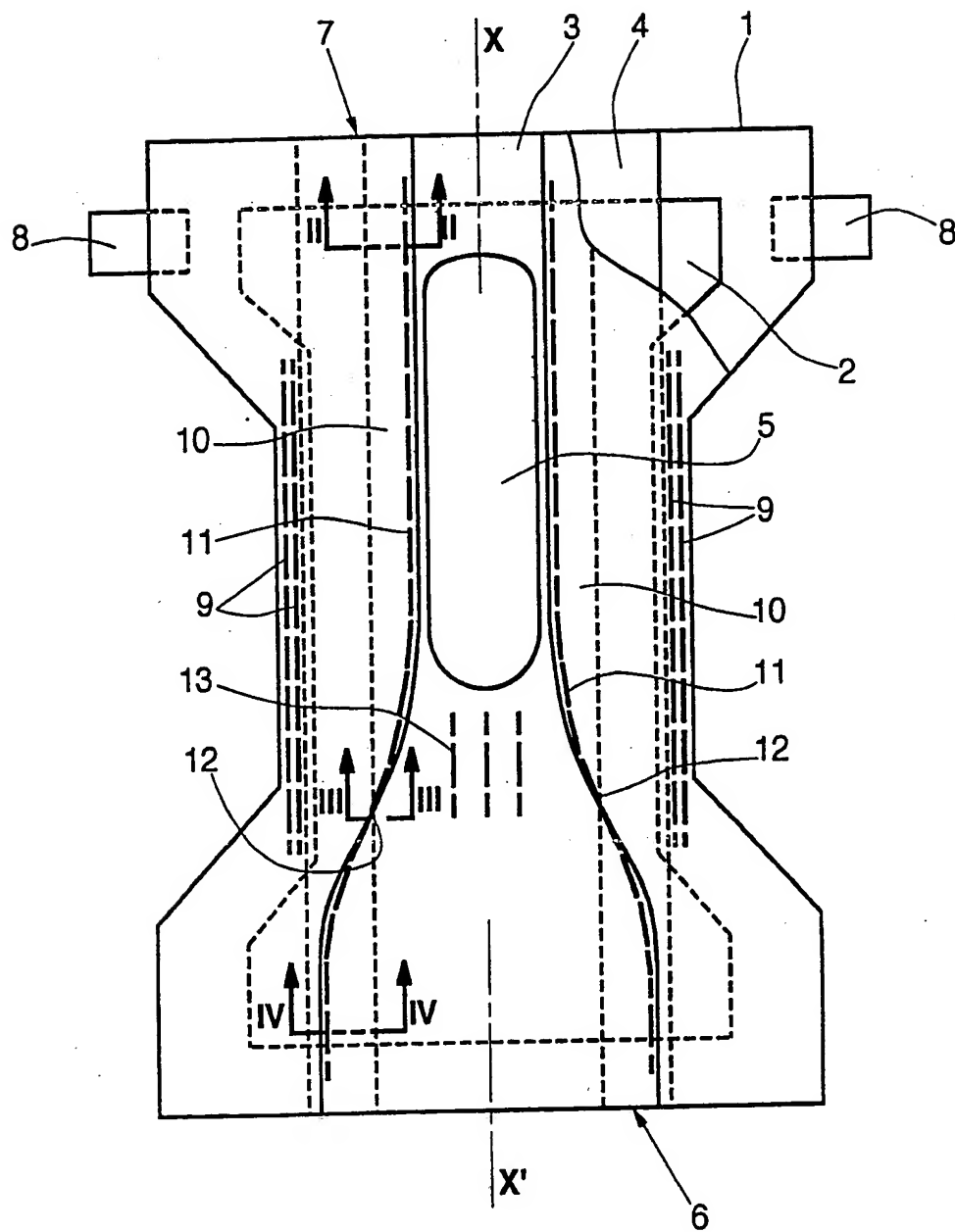


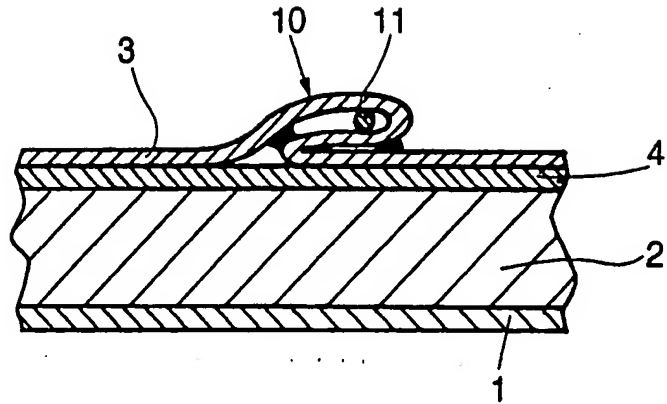
FIG.4



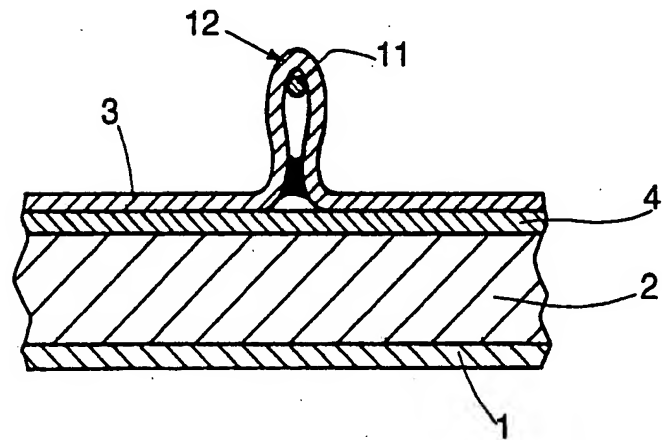
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FIG.1

**FIG.2**



**FIG.3**



**FIG.4**

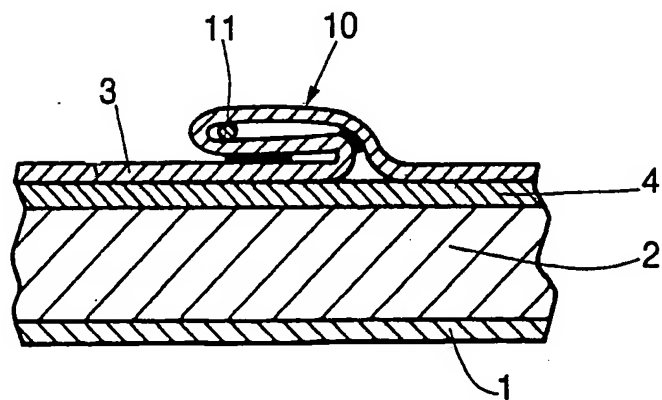
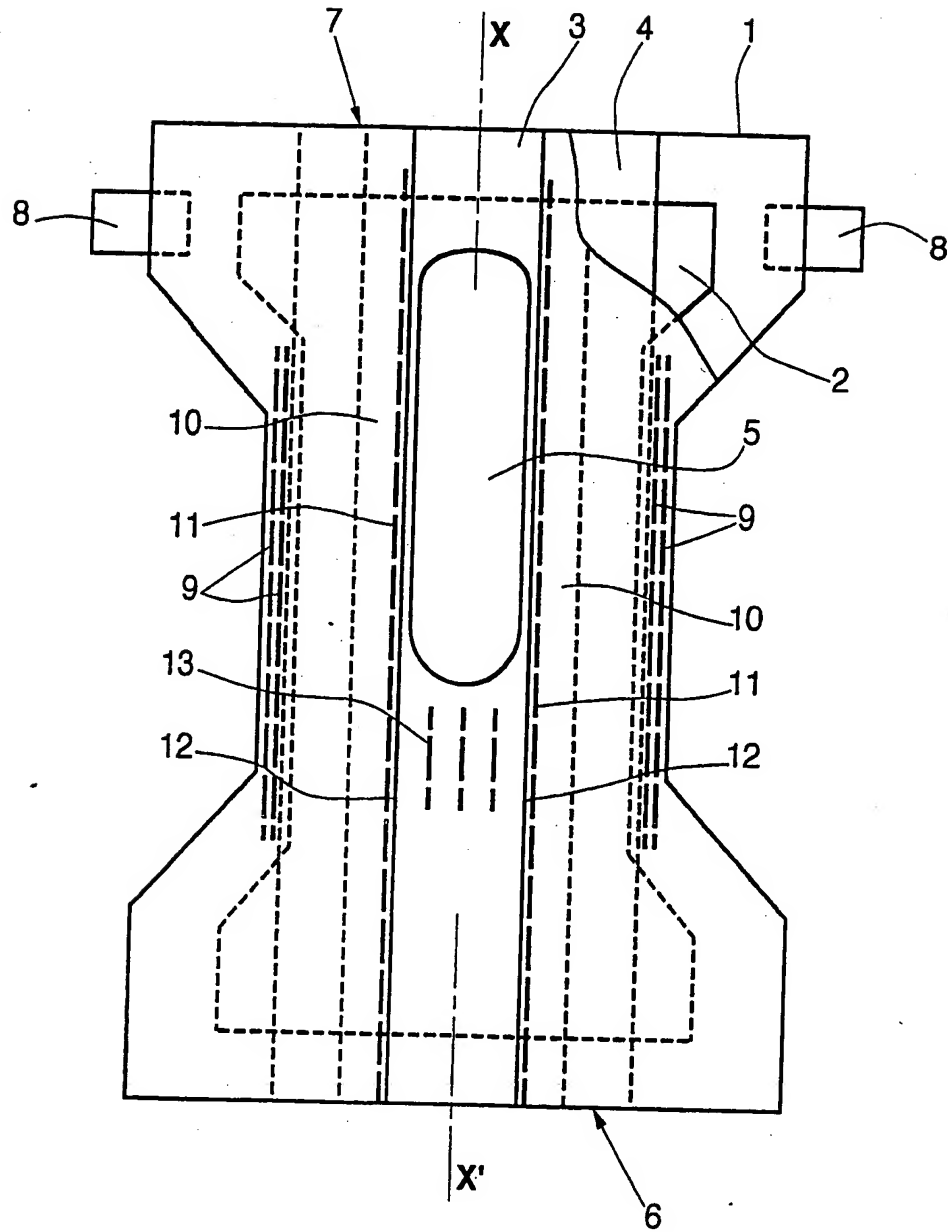


FIG.5

Disposable absorbent article of hygiene with surface web provided with an opening for receiving stools

The invention relates in general to a disposable absorbent article of hygiene, such as a disposable absorbent diaper intended for young children or for incontinent people, of the type comprising an absorbent pad arranged between an outer support sheet which is impermeable to liquids and an inner surface sheet or web which is permeable to liquids.

More particularly, the invention relates to such a disposable absorbent article of hygiene in which the inner surface sheet includes an opening intended to receive the stools, and small longitudinal side barriers, situated in front of the opening to prevent leaks of urine.

Articles of hygiene of this type are known, for example, from Patent US-A-4,662,877 (Johnson & Johnson). According to this document, the inner surface sheet of the article of hygiene is provided with an opening of elongate shape which is offset toward the front of the article, the length of which is chosen such that the stools are normally directed through this opening onto the center of the article above the absorbent pad. The longitudinal edges of the opening are provided with elastic elements fixed in the stretched state.

French Patent Application FR-A-9210601 (Peaudouce) also describes a diaper in which the inner surface sheet includes a central elongate opening and two elasticized double longitudinal folds extending over the entire length of the diaper, situated on either side of the central opening. The two foldings of each double fold are solidly attached to each other over the entire length of the double folds.

Patent Application EP-A-357,298 (The Procter and Gamble Company) describes a disposable absorbent article such as a diaper, comprising an outer support sheet which is impermeable to liquids, a sheet which is permeable to urine, and an absorbent pad between the outer support sheet and the urine-permeable sheet. The urine-permeable

sheet includes a passage which allows communication of solid fecal matter with the pad, thus isolating this fecal matter from the skin of the user. This passage is an oblong opening which is slightly offset toward the rear of the article. Elastic elements are fixed to the urine-permeable sheet in front of and behind the oblong opening to ensure contraction of the urine-permeable sheet in these regions.

European Patent Application EP-A-374,640 (The Procter & Gamble Company) describes an absorbent article comprising an outer support sheet which is impermeable to liquids, a surface sheet which is permeable to liquids and an absorbent pad arranged between the outer support sheet and the surface sheet. A barrier is arranged adjacent to each longitudinal edge of the article and has a proximal edge and a distal edge. Spacer means, such as elastic elements, separate the distal edge of the barriers from the surface sheet. The barriers are fixed in a first belt region such that their distal edges are on the inside with respect to their proximal edges and in a second belt region such that their distal edges are on the outside with respect to their proximal edges. Thus, the barriers are inflected and have a part which is folded toward the outside in order to ensure a sealing action around the buttocks of the user and to contain the exudates, and a raised part producing a channel to contain, confine and hold the body exudates.

British Patent Applications GB-A-2,265,834, 2,266,055 and 2,265,550 (Uni-charm) also describe diapers in which the inner surface sheet includes a central opening of elongate shape, it being possible for this central opening to be provided with two longitudinal side flaps, one edge of which is joined to the longitudinal edges of the opening and the other edge of which is free, it being possible for the edges of these flaps to be elasticized.

Although these devices described in the prior art prove relatively effective, it would be further desirable to improve the confinement and isolation of the fecal

matter, in particular of the urine, to prevent extensive contact of this fecal matter with the skin of the user, and also improve the leaktightness with respect to the emission of urine.

5           The object of the invention is therefore to provide a disposable absorbent article of hygiene which has both better isolation of the fecal matter, in particular with regard to the emission of urine, and improved leaktightness with respect to the emission of  
10 urine.

          According to the invention, a disposable absorbent article of hygiene, such as a diaper, is produced which is symmetrical with respect to a longitudinal mid axis, having front and rear transverse edges, and which  
15 comprises an outer support sheet which is impermeable to liquids, of rectangular general shape, an absorbent pad of rectangular general shape, fixed onto said outer support sheet and an inner surface sheet which is permeable to liquids, covering the absorbent pad. This  
20 liquid-permeable inner surface sheet is fixed on its periphery to the outer support sheet.

          The article of hygiene furthermore comprises attachment means for closing it around the waist of a user.

25           The article moreover comprises longitudinal elastic elements fixed, in the stretched state, to the support sheet on the outside of the longitudinal edges of the absorbent pad, at least in a crotch region.

          The liquid-permeable inner surface sheet is  
30 provided with at least one longitudinal opening which is symmetrical with respect to the longitudinal mid axis of the diaper, is generally of oblong or elongate shape and has a width less than that of the absorbent pad. According to the invention, this longitudinal opening is  
35 offset with respect to the center of the article in the direction of the rear transverse edge of the diaper, in order to be arranged symmetrically with respect to a point of acquisition of stools which is situated at a predetermined distance from the rear transverse edge of

the article. The inner surface sheet is also fixed to the absorbent pad except in a region situated below the opening, which, preferably, is of dimension greater than the opening.

5           The inner surface sheet also comprises, according to the invention, two longitudinal folds forming closed tubular sheaths, which folds are substantially parallel to the longitudinal mid axis of the article, and which extend over the entire length of the article on either  
10 side of the longitudinal opening. At least one elastic element is fixed, in the stretched state, in the upper part of the sheaths formed by the folds. Each of the folds comprises a first longitudinal region going from the rear transverse edge of the article substantially as  
15 far as the front transverse edge of the longitudinal opening into which the fold is folded toward the inside in the direction of the longitudinal mid axis and is fixed to the underlying part of the inner surface sheet over the entire length of this first region, for example  
20 by an adhesive bonding line. Each of the folds also comprises a second region going substantially from the front transverse edge of the longitudinal opening as far as the front transverse edge of the diaper, in which the fold is free over most of this second region, is folded  
25 either toward the outside in the direction opposite the longitudinal mid axis or toward the inside in the direction of said axis and is fixed to the underlying part of the inner surface sheet in proximity to the front transverse edge of the article, for example by adhesive  
30 bonding.

          Because the folds, in their first regions, are folded toward the inside and fixed to the underlying part of the surface sheet, better fitting of the longitudinal opening to the anatomy of the user is obtained, in  
35 particular at the point of acquisition of stools, since the opening is centered on this point. In fact, these elasticized first regions of the folds, which are fixed to the underlying parts of the surface sheet along the longitudinal edges of the opening, raise the surface



sheet along the longitudinal edges of the opening and apply it to the buttocks of the user, whatever the attitude of the user. Furthermore, since the folds are fixed in their second regions to the respective underlying parts of the surface sheet, only in proximity to the front transverse edge of the article, side sealing barriers are formed which ensure better leaktightness to the risks of transverse leaks of urine.

In a recommended embodiment, the longitudinal folds are folded toward the outside with respect to the longitudinal mid axis, which represents twisting through  $180^\circ$  with respect to the first regions of the folds, these small barriers thus formed rising up, whilst having a tendency to turn toward the outside and separate from each other in the direction of the front transverse edge of the article, which ensures better fitting of the barriers to the anatomy of the user and offers a maximum area for absorption of urine in the front part of the article, whatever the attitude of the user.

In another recommended embodiment, the absorbent article of hygiene furthermore comprises an intermediate sheet which is permeable to liquids, situated between the absorbent pad and the inner surface sheet, this intermediate sheet covering the pad at least in the region of the longitudinal opening and being fixed to the absorbent pad. Also preferably, this intermediate sheet, fixed to the pad, extends over the entire length of the absorbent article of hygiene and has a width greater than that of the longitudinal opening. The inner surface sheet can then be fixed to the intermediate sheet, with the exception, as before, of a region situated below the opening.

In order further to improve the effectiveness of the longitudinal opening, elastic elements, which are preferably parallel, are fixed, in the stretched state, symmetrically with respect to the longitudinal mid axis of the article, to the inner surface sheet, in front of the longitudinal opening. Also preferably, these elastic elements are arranged such that they terminate near the

front transverse edge of the opening, so as to keep the greatest possible area of the opening and lift the surface sheet in this region above the absorbent pad.

The rest of the description refers to the annexed drawings which represent, respectively:

- Figure 1, a top view, partly cut away, of a diaper according to the present invention;

- Figure 2, a view in section along the line II-II of Figure 1;

10 - Figure 3, a view in section along the line III-III of Figure 1;

- Figure 4, a view in section along the line IV-IV of Figure 1; and

15 - Figure 5 a top view, partly cut away, of another embodiment of a diaper according to the invention.

Referring to Figures 1 to 4, the diaper represented comprises, in a manner which is known per se, a support sheet 1 which is impermeable to liquids, an  
20 absorbent pad 2, for example made of cellulose pulp, optionally with incorporation of a so-called super absorbent polymer material, and a liquid-permeable surface sheet 3, for example made of a web of hydrophilic nonwoven. The two sheets 1 and 3 have the same dimensions  
25 and the same hour glass shape, that is to say a rectangular shape with two opposite side indentations delimiting, in the direction of the length of the diaper, a crotch region of reduced width between two end regions of increased width whose transverse edges define front 6 and  
30 rear 7 transverse edges of the diaper.

The absorbent pad 2 arranged between the sheets 1 and 3 also has an hour glass shape, but of smaller dimension than the two sheets 1 and 3 which are joined together, for example, by adhesive bonding, on the  
35 periphery of the pad 2. Longitudinal elastic elements 9, each consisting, for example, of one or more elastic strands or yarns or of an elastic strip, are fixed, in the stretched state, to the support sheet 1, at least in the crotch region between the longitudinal edge of the

sheet 1 and the corresponding longitudinal edge of the absorbent pad 2.

As shown by Figure 1, the inner surface sheet 3 includes an opening, generally of oblong or elongate shape, which is symmetrical with respect to the longitudinal mid axis XX' of the diaper and has a width less than the width of the absorbent pad in the crotch region. Preferably, this opening has a width less than half the width of the pad 2 in the crotch region. This opening of elongate shape is offset with respect to the center of the diaper, in the direction of the rear transverse edge 7 of the diaper, so as to be arranged symmetrically with respect to a point of acquisition of stools which is situated at a predetermined distance from the rear transverse edge 7 of the diaper. Clearly, the dimensions of this opening 5 depend on the user for which the diaper is intended. In one embodiment, given by way of example, for a diaper of the size called "MAXI" (8-18 kg), the opening 5 is substantially rectangular, having a length of 200 mm and a width of 40 mm, and is arranged symmetrically with respect to the point of acquisition of stools which, in this example, is situated at a distance of 125 mm from the rear transverse edge of the absorbent pad. Preferably, the diaper includes a liquid-permeable intermediate band or sheet 4, for example made of hydrophilic nonwoven, extending over the entire length of the diaper and of width greater than the width of the absorbent pad in the crutch region, and therefore also than the width of the longitudinal opening 5. Furthermore, the length of this intermediate sheet 4 might also be less than that of the diaper, and even than that of the absorbent pad, so long as it is greater than the length of the longitudinal opening 5. Preferably, this intermediate sheet is fixed to the absorbent pad 2. The inner surface sheet 3 is fixed to this intermediate sheet 4 with the exception of a region situated below the longitudinal opening 5. This region in which the inner surface sheet 3 is not fixed to the intermediate sheet 4 is of dimension greater than the longitudinal opening 5.

For example, for the dimensions of the longitudinal opening 5 given above, this region may be a rectangular region with a length of 370 mm and a width of 100 mm.

5 The inner surface sheet 3 is also provided in its front part with parallel longitudinal elastic elements 13, arranged in the stretched state, substantially parallel to the longitudinal mid axis XX' of the diaper. These elastic elements preferably terminate near the front transverse edge of the opening 5, so as to keep the  
10 greatest possible area of the opening and raise the surface sheet in this region above the absorbent pad. Although three elastic elements 13 have been represented, it is clear that it is possible to use a greater or lesser number thereof, for example, only two elastic  
15 elements arranged symmetrically on either side of the longitudinal mid axis XX', separated by a suitable distance so as not to impair passage of the urine toward the absorbent pad 2 into the central part of the diaper.

20 Orientations other than an orientation parallel to the longitudinal mid axis may also be used for these elastic elements 13, in particular an arrangement inclined with respect to the longitudinal mid axis, having the general shape of a V, with the tip of the V pointing toward the front edge of the opening 5.

25 The elastic elements 13 may be made of any material having satisfactory elastic properties, in particular yarns of rubber or of Lycra<sup>®</sup> or made of a thermoelastic material.

30 Preferably, the elastic elements 13 are fixed to the surface sheet 3 via an additional sheet (not shown), such as a nonwoven, by means of any suitable method such as adhesive bonding, ultrasonic welding or heat-sealing, such that these elastic elements are sandwiched between the additional sheet and the surface sheet 3.

35 The surface sheet 3 also includes two parallel longitudinal folds 10, extending over the entire length of the diaper and arranged on either side of the longitudinal opening 5 in proximity to the longitudinal edges of the latter. The lower edges of the folds 10 are joined by

a longitudinal fastening line, for example by an adhesive bonding line, over the entire length of the folds, to form closed sheaths. Longitudinal elastic elements 11 are arranged, in the stretched state, inside the folds in the upper part of the closed sheaths formed by these folds 10. Each of the folds 10 furthermore comprises a first region going from the rear transverse edge 7 of the diaper substantially as far as the front transverse edge of the opening 5 in which, as is better shown by Figure 2, the fold 10 is folded toward the inside of the diaper in the direction of the longitudinal mid axis XX' of the diaper and is fixed to the underlying part of the inner surface sheet 3 over the entire length of this first region, for example by an adhesive bonding line. Each of the folds 10 also includes a second region going substantially from the front transverse edge of the opening 5 as far as the front transverse edge 6 of the diaper in which the fold 10 is free over most of this second region and is folded toward the outside in the direction opposite the longitudinal mid axis and fixed to the underlying part of the inner surface sheet 3, for example by adhesive bonding, in proximity to the front transverse edge 6 of the diaper. Thus, as is better seen in Figure 3, because the upper edge of the fold 10 is free in most of this second region, and the fold 10 is fixed to the surface sheet 3 over the entire length of the first region and in proximity to the front transverse edge 6, thus undergoing twisting through 180°, the fold 10 rises in the free part of this second region, thus forming small longitudinal barriers 12 which prevent leaks of urine. Furthermore, this fastening of the folds 10 to the underlying parts of the surface sheet 3 makes the folds 10 separate from each other in the direction of the front transverse edge 6 of the diaper, thus offering a larger absorption area in front of the opening 5, which ensures better distribution of the urine in the absorbent pad and consequently better comfort for the user.

Referring now to Figure 5, a representation has been given of another embodiment of a diaper according to

the invention, which differs from the diaper in Figure 1 only in that the longitudinal folds 10 are folded in their second regions toward the inside in the direction of the longitudinal mid axis XX' and are fixed to the underlying parts of the surface sheet 3 near to the front transverse edge 6 of the diaper. Thus, under the action of the longitudinal elastic elements 11, the free edge of the second regions of the folds rise above the surface sheet 3 over most of these second regions, thus forming lateral sealing barriers with respect to transverse leaks of urine.

A diaper is thus produced which ensures excellent isolation of fecal matters with respect to urine and prevents extended contact between the latter and the skin of the user, which at the same time allows better leak-tightness with respect to leaks of urine.

CLAIMS

1. Disposable absorbent article of hygiene which is symmetrical with respect to a longitudinal mid axis (XX') having front (6) and rear (7) transverse edges, which comprises an outer support sheet 1 which is impermeable to liquids, of rectangular general shape, an absorbent pad  
5 (2) of rectangular general shape, fixed onto the outer support sheet, an inner surface sheet (3) which is permeable to liquids, covering the absorbent pad, fixed on its periphery to the outer support sheet, said inner surface sheet (3) comprising at least one longitudinal opening (5) which is symmetrical with respect to the longitudinal mid axis (XX') of  
10 the diaper and has a width less than that of the absorbent pad (2), said longitudinal opening (5) being offset with respect to the center of the article in the direction of the rear transverse edge (7) of the article, to be arranged symmetrically with respect to a point of acquisition of  
15 stools which is situated at a predetermined distance from said rear transverse edge (7) of the article, this inner surface sheet (3) being fixed to the absorbent pad, with the exception of a region situated below the longitudinal opening (5) and of dimension greater than the latter, and two longitudinal folds (10) which are substantially parallel  
20 to the longitudinal mid axis (XX') of the diaper, extending over the entire length of said diaper on either side of the longitudinal opening (5), each of said folds (10) forming a closed sheath in which a longitudinal elastic element (11) is fixed, in the stretched state, characterized in that:
- 25 - each of the folds (10) includes a first longitudinal region going from the rear transverse edge (7) of the article substantially as far as the front transverse edge of the longitudinal opening (5) into which the fold is folded toward the inside in the direction of the longitudinal mid axis (XX') and is fixed to the underlying part of the  
30 inner surface sheet (3) over the entire length of the said first region, and a second region going from said front transverse edge of the longitudinal opening (5) as far as the front transverse edge (6) of the article, in which the fold (10) is free over most of this second region

and is folded either toward the outside in the direction opposite the longitudinal mid axis (XX') or toward the inside in the direction of said axis and is fixed to the underlying part of the inner surface sheet (3) in proximity to the front transverse edge (6) of said article.

5    2.    Article according to claim 1, characterized in that the folds (10) are folded, in their second region, toward the outside in the direction opposite the longitudinal mid axis (XX').

3.    Article according to claim 1 or 2, characterized in that elastic elements (13) are fixed, in the stretched state, substantially  
10    symmetrically with respect to the longitudinal mid axis (XX') of the article to the inner surface sheet (3), in front of the longitudinal opening (5).

4.    Article according to claim 3, characterized in that the elastic elements (13) are parallel to the longitudinal mid axis (XX').

15    5.    Article according to claim 3, characterized in that the elastic elements (13) are arranged in a V shape whose tip points toward the front edge of the opening (5).

6.    Article according to any one of claims 1 to 5, characterized in that it comprises an intermediate sheet (4) which is permeable to  
20    liquids, situated between the absorbent pad (2) and the inner surface sheet (3), the surface sheet (3) being fixed either to the absorbent pad (2) or to the intermediate sheet (4), with the exception of said region situated below the opening (5).

7.    Disposable absorbent article as claimed in claim 1 substantially as hereinbefore described with reference to and as illustrated in Figures 1 to 4, or Figure 5 of the accompanying drawings.



**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**(The Search report)**

Application number  
 GB 9424632.9

**Relevant Technical Fields**

Search Examiner  
 R J MIRAMS

- (i) UK Cl (Ed.N)     A3V  
 (ii) Int Cl (Ed.6)     A61F 13/15

Date of completion of Search  
 2 MARCH 1995

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-  
 1 TO 7

(ii) ONLINE: WPI, CLAIMS

**Categories of documents**

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Category	Identity of document and relevant passages	Relevant to claim(s)
A	US 4662877 A (JOHNSON)	

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